

a substrate having a surface, a drain region, a channel region and a source region;

a trench formed in said substrate from said source region to said drain region, said trench formed vertically, essentially perpendicular to said surface of said substrate, said trench having trench walls;

a first dielectric layer formed essentially on said trench walls;

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a charge storage layer for storing charges, said charge storage layer being formed on said first dielectric layer;

a control layer trench formed in said charge storage layer and defined by walls, said charge storage layer surrounding said control layer trench;

a second dielectric layer formed at least partially on said walls of said control layer trench and having a surface, said second dielectric layer defining a remaining part of said control layer trench;

a control layer formed essentially on said surface of said second dielectric layer, said control layer including a

control filler layer formed in said remaining part of said control layer trench and a control gate layer located on said surface of said substrate;

a trench extension formed essentially underneath said trench, said trench extension having a surface;

a third dielectric layer formed on said surface of said trench extension; and

a filler material for at least partially filling said trench extension, said filler material separated from said control filler layer.